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THE CORRELATES OF VISION LOSS
IN THE ADULT BLIND

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In Partial Fulfillment of the
Requirements for the Degree
of
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By Robert J. Teare

Entitled Correlates of Vision Loss in the Adult Blind

Complies with the University regulations and that it meets the accepted standards of the Graduate School with respect to originality and quality

For the degree of:

Doctor of Philosophy in Psychology

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This thesis is not to be regarded as confidential

Joseph Tiffin
Professor in charge of the thesis

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To Dr. Joseph Tiffin, my major professor and project supervisor, I express my deep gratitude for the guidance he has provided and the encouragement he has given me during the years of my graduate training. His influences as a teacher and as a person will long be remembered.

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ABSTRACT

TEARE, ROBERT JOHN, Ph.D., Purdue University, August, 1960. CORRELATES OF VISION LOSS IN THE ADULT BLIND, 1960. A thesis prepared under the supervision of Dr. Joseph Tiffin.

The objectives of this research were to: (1) determine the influence of remaining vision on the factor structure of a battery of aptitude tests, and (2) evaluate the effects of three early experience parameters (vision level, onset age, parental occupation level) on the adult job achievement of the legally blind.

The factor analysis study utilized three groups of visually disabled persons. There were 97 individuals in the High Vision group, 147 persons in the Mid-Vision group, and 206 persons in the Low Vision group. Vision level ranged from 80 per cent loss to total blindness.

A principle components factor analysis was carried out at each of the three vision levels. Each analysis gave three factors. The structure of these factors changed systematically as vision decreased.

The analysis of adult job achievement involved a 3 x 3 x 2 factorial unweighted means analysis of variance.

A sample of 440 individuals was used. The treatments consisted of three levels of vision loss, three levels of parental occupation, and two onset age levels. The analysis revealed a complex pattern of interactions among the three treatments. Vision loss affected job achievement; the lowest level of attainment was in the Mid-Vision group. The offspring of high achieving parents attained higher job placement than either of the other two groups. Onset age differences were obscured because of differential influences of parental occupation and level of remaining vision.

FOREWORD

The data reported in this dissertation were gathered as part of a larger research project. The project, "An Investigation of Vocational Success with the Blind," was supported by a research and demonstration grant of the Department of Health, Education, and Welfare's Office of Vocational Rehabilitation.

The grant award was administered through the facilities of the Purdue Research Foundation and was under the direction of Dr. Joseph Tiffin of the Department of Psychology.

INTRODUCTION

Previous Research

Since the beginning of organized work in the vocational rehabilitation of the physically handicapped, those individuals who have lost the important sense modalities of sight and hearing have posed special problems for the vocational counsellor and the employer. In the main, difficulties have arisen because of a lack of basic information about the effects of the sensory loss. For a number of years, theories involving the development of "sixth" senses and compensatory "sharpening" of the remaining senses could be found in the literature of psychology and rehabilitation (Chevigny, 1950). Research work has tempered these theories to a great extent (Worcel, 1951; Crafts, 1950). It has taken a long time for rehabilitation personnel to realize that

> "...although blind persons are compelled to use touch to get information others get through vision, their sense of touch is no more acute than it would have been had they seen; they learn to interpret sound cues which are of no importance to those who see, but no individual's hearing is actually improved because he loses his vision" (Bauman, 1954, p. 13).

The investigation of sensory loss is of considerable interest today, although a more empirical approach has been taken (Zahl, 1950). A good deal of research at the animal level has been carried out, notably by Hebb and his students. Of particular concern has been the effects of differential loss occurring at various developmental stages of life (Hebb, 1949; Riesen, 1947, 1950).

The gathering of psychometric data on the disabled individual creates difficulties for the psychologist as well. Problems arise with regard to: (1) the construction of the testing instrument, and (2) the generalization of results across visually different populations. With regard to the former, the loss of one of the senses restricts the choice of vehicles through which performance information can be gathered. Since most psychological tests are designed for the sighted, this is particularly true when the disability is blindness. The choice is further restricted because of a need for formats which do not distort the picture of the domain being measured.

The generalization of test results across different visual groups has long been a concern to rehabilitation research personnel. In order to demonstrate the effectiveness of the rehabilitation process, writers have compared the test performance of blind and normally sighted individuals (McFarland, 1956; Primoff, 1956). An added impetus for generalized results has been the firm policy of the United States Civil Service Commission that test materials be chosen so as not to prejudice the performance of a blind job competitor because of an unsuitable format (Primoff, 1956).

Difficulties are not limited solely to comparisons between sighted and blind populations. "Legal blindness" as defined for tax exemption, pension, and compensation purposes refers to any visual condition between Snellen acuity 20/200 and total blindness and/or a restriction of the angular visual field to 20 degrees or less. The condition is determined by the acuity in the better eye with maximum correction. The legally blind, therefore, represent a heterogeneous group with regard to amount of remaining vision. Furthermore, the partially sighted individual is not in the minority. The latest census data available indicate that of the 320,000 legally blind persons in the United States, between 60 to 75 per cent have some partial vision (Hurlin, 1953). There is every reason to believe that medical and surgical achievements in recent years have served to increase the proportion of partials by arresting progressive vision loss before it can completely destroy sight.

In the past, research workers have felt it necessary to "control" for degree of remaining vision. This usually involved an attempt to remove it as a source of variation. The control procedures involved: (1) developing separate norms for the sighted and blind; (2) attempting to hold vision constant through the use of blind folds, masks, and shields; (3) building "equivalent" and therefore equally valid instruments for the various groups; and (4) selecting a sample which consisted only of totally blind individuals.

Because of the make-up of the legally blind population, the removal of the partials from research samples is unrealistic and impractical. In procedure (2) above, "controlling" for vision by using a blindfold may introduce distortions into the testing situation. Blindfolding a normally sighted person or an individual with useful vision forces him to use his remaining sensory avenues to obtain his information cues. Typically, touch must be substituted. To the extent that the subject has relied on vision in his everyday activities, this new medium might be unfamiliar to him. This approach, it would seem, could prejudice results in favor of the totally blind. Artificial controls can also have repercussions with regard to test validity. If visual acuity is related, positively or negatively, to the successful performance of the job, it constitutes an ability that the worker will bring to the job situation. It follows logically that to insure representativeness of the test score-job success relationship, vision should be allowed to exert its natural influence.

If a test calls for the same abilities to the same extent regardless of the subject's acuity, approaches (1) and (2) would seem to be unnecessary. Current research evidence, particularly in the area of intelligence testing, yields contradictory results. Watson (1956), using a tactual modification of the Wechsler Performance Scale demonstrated a negative correlation with vision. Jones (1960), in working with a non-verbal tactual intelligence scale showed results which were free of any correlation with vision level.

The somewhat contradictory picture of research results indicated by the above findings is not unusual. Part of the difficulty lies in the definition of the word "blindness." The word has had a variety of meanings with regard to the amount of residual vision an individual can possess and still be regarded as blind. In this respect, the researcher has been no different from the medical man and the lawmaker.

In gathering research data, there has been a varying amount of emphasis on comparison with normally sighted individuals. When comparisons have been made, the research has usually been preceded by a careful matching of blind and sighted subjects with regard to personal history and mental ability characteristics. This procedure could have resulted in a rather selective sample of blind individuals. There is no doubt that it served to reduce the number of clients potentially eligible for participation in the research.

In the study mentioned above, Watson (1956) demonstrated differences between the performance of his normally sighted, partially sighted, and totally blind subjects. The criterion task was performance on a tactual intelligence scale and all subjects were blindfolded. The fact that the mean performance of his subjects decreased significantly as vision increased lends some credence to the possibility that performance might have been critically influenced by the removal of visual cues in those individuals with sight. The subjects in Jones' (1960) research were not blindfolded.

With the noteworthy exception of the comprehensive research study undertaken by Bauman (1954), a common characteristic of research efforts has been the specificity of the problem investigated. This narrow approach to specific problems seems premature in a field where so little is known about basic phenomena. Generalizations from previous work are difficult to make. Research has been carried out under conditions which distort or preclude the evaluation of vision as a variate. Workers have used a variety of sampling procedures and have required subjects to perform different criterion tasks.

It would seem that in order to study vision loss adequately, certain properties and design characteristics should be built into the research. The sample used for study should be as large as time and money will permit. Persons included in the research should be heterogeneous with regard to degree of remaining vision, age, race, socio-economic background, and educational achievement. If vocational achievement is to be a variable, all levels of jobs should be included as well as a wide variety of labor markets. If an aptitude picture is desired, a variety of testing instruments should be used. Most important of all, if vision is to be investigated as a source of variation, it should be allowed to exercise its normal influence on the results. It was with these considerations in mind that Purdue University undertook a three-year study of the vocational success of the legally blind.

THE PURDUE RESEARCH PROJECT

Purpose

In June, 1957, the Purdue Research Foundation was awarded a three year research contract by the Department of Health, Education, and Welfare. Among its initial objectives, the research activity had as its goals the: (1) development of new approaches to the measurement of general and specific skills of the adult blind, and (2) the validation of these measures against a criterion of vocational success.

The purposes mentioned above are rather specific in nature. As research progressed, considerations of a more general nature also became of interest and importance. In developing the testing measures and procedures, problems peculiar to the testing of a disabled population arose. Consideration had to be given to the choice of appropriate test formats and domains. Various methods of controlling for remaining vision were discussed and discarded. Aside from these aspects, the data themselves acted to steer the direction of the research. The wide variety of personal history, attitude, and personality data which were gathered on each subject allowed the researchers to come up with a fairly detailed picture of each person tested.

The end result of these considerations was an increase in the scope of the research activity to include an investigation into the personal adjustment, biographical history, and occupational success correlates of individual differences in vision.

The Research Sample

Contacting Procedure. Clients tested in any area were contacted through the agency(s) serving that area. It was the policy of the project staff to give a complete explanation of project details, aims, and procedures to each agency. This enabled the agency staff to evaluate the merits of the project and decide on the extent of their cooperation. The agencies involved included non-profit employment centers, production workshops, a roller bearing fabrication plant, and regional Offices of Vocational Rehabilitation. For the most part, subjects were selected from lists of clients who were receiving or had requested various services from the agencies in question. These services included educational aids or materials, job and travel training, placement, or actual employment with the agency.

Sampling Criteria. In order to be included in the sample, each client had to meet certain criteria. A client had to be: (1) legally blind (as defined earlier); (2) between 20 and 50 years of age; and (3) affected by no major disability other than blindness.

The legal definition of blindness was used instead of restricting the sample to the partially sighted or totally blind. It was felt that the results thus generated would be more representative of the population as a whole and would permit meaningful comparisons between vision subgroups to be made.

Twenty was chosen as the lower age limit in order to insure that all individuals would have an opportunity to complete high school and any prevocational training available through local service agencies. An upper age limit of 50 was set because it was felt that the 30 year span thus included represented the peak period of employment desirability. After the age of 50, the age variable itself directly influences employment potential, particularly in the case of the disabled worker. Also, as the body ages, the incidence of vision defects rises sharply simply because of eye deterioration. This is attested to by the fact that over 50 per cent of the blind population are 50 years of age or older (Donahue and Dabelstein, 1950).

Clients who had multiple disabilities, i.e. loss of sight and hearing, were not included in the sample. A multiple loss would have made the isolation of the effects of blindness alone quite difficult and would have removed or severely restricted another avenue through which test information could have been presented.

Because employment potential or employability was of foremost interest, once the subject met the above-mentioned restrictions, he was placed into one of three major employment categories. The first category, competitive employment, refers to jobs which are performed in work environments where the sighted person predominates. In these jobs, the incumbent competes directly with sighted co-workers with regard to job security, seniority, and remuneration. The second category, traditional (or sheltered) employment refers to jobs which are typically carried out by the sightless and are performed in work environments where the blind worker predominates. In such environments, every effort is made to maintain job security. This was sometimes done at the expense of salary. The last category, unemployment, is comprised of those individuals who had not been gainfully employed for six months or more prior to the time of testing. There were obvious reasons why some clients were not working. Thus, such persons as full-time students and housewives with children to care for did not fall into the unemployed category. In order to be classified as unemployed, an individual had to be considered capable of and available for full-time employment (OVR Status VI). If an individual did not meet all of the above criteria, he was not tested.

Composition and Representativeness of the Sample. The final sample drawn for study was comprised of 626 adults. A complete breakdown of the sample by age, employment category, sex, and degree of remaining vision can be found in Table 1. Data on these individuals were gathered from December, 1957 to September, 1959 in 19 test centers throughout the middle west and eastern United States. A breakdown of the sample by location is presented in Appendix A. These centers were chosen either because they contained concentrations of blind clients in metropolitan areas or because they were centrally located to a group of rural clients. No attempt was made to control for or balance rural and urban sampling.

Since the last major national census in 1950, some systematic attempts to estimate the prevalence of blindness have been made (Hurlin, 1953; Hurlin, 1950). Outside of the rate per thousand individuals and a rough breakdown by state, not too much is known about the overall population of blind individuals with regard to specific characteristics. Organized compilation of blind census data was discontinued with the 1950 census. Because of these factors and for purely practical reasons, no attempt was made to gather an organized sample representative of what was known about the total population.

There are some obvious differences between the Purdue sample and the national group. First of all, the upper age limit of 50 excluded more than half of the total blind population. As was mentioned earlier, between 60 - 75 per cent of this population is partially sighted. Only 52 per cent

Table 1

Breakdown of the Sample by Age, Employment Category, Sex, and Degree of Remaining Vision

	N
Age:	
20 - 29	159
30 - 39	220
40 - 50	247
Employment:	
Competitive	165
Traditional:	
Shop	233
Agency	60
Vending Stand	26
Unemployed	87
Part time & unclassified	55
Sex:	
Males	439
Females	187
Remaining Vision:	
80 - 90% loss	128
91 - 99% loss	195
Total blindness	303

of the research sample had partial vision. Since individuals were contacted through service agencies, it should be expected that the individual with good functional vision would be encountered less often. Rates for non-whites are found to be from two to three times as high as those of white persons (Britten, 1941). The Purdue sample contained 475 white subjects and 151 who were non-white. Since the white-non-white ratio is less in northern cities than in southern cities (Britten, 1941), the observed ratio should reflect more the ratios characteristic of cities such as Chicago, Indianapolis, and New York.

It is also possible that because of the nature of the contacting procedure and because the test battery took between three to four hours to administer, other biasing factors might enter in. Great care was taken to make the testing hours flexible enough to include those engaged in all types of employment. Transportation was provided when lack of it would preclude testing. Financial payments were made as an added inducement. It was hoped that these measures would serve to reduce the proportion of habitual volunteers and avoid getting a preponderance of good, aggressive travelers. There is some indication that the sample gathered is representative of those individuals receiving rehabilitation services. An analysis of vision cases (Donahue and Dabelstein, 1950) rehabilitated at the national level indicated that 70 per cent of the case loads were male and 33 was the average age. Seventy per cent of the Purdue sample were males and the average age was 36.3 years.

The Test Battery

Many factors play a part in determining the vocational effectiveness of an individual. Therefore, when this effectiveness is to be evaluated and attempts made to predict it, as many of these factors as possible should be taken into account. Since such things as intelligence, specific skills, personality, and personal history contribute to the make-up of the individual, a global evaluation should yield a more realistic picture than the separate study of isolated traits. Accordingly, the research battery was assembled to give the researchers an integrated picture of each individual within the most practical time possible. The battery contained techniques which can be grouped into four major areas of measurement: intelligence, personal history, specific manual skills, and personality. These tests are described and illustrated in detail elsewhere (Gruber, 1959; Jones, 1960; Palacios, 1959; Teare, 1958), but a brief look at the ones pertinent to this thesis is in order.

Personal History. Prior to any actual testing, a Biographical Data Blank (see Appendix B) was filled out on each person. The form contained 56 items dealing with family background, socio-economic history, extent of the disability, and prevocational and employment information. When completed, it enabled the researcher to make sure that sampling restrictions had been met and allowed him to classify the individual with regard to his disability and employment status.

Intelligence. Two types of intelligence tests were used. The first, the Wechsler Adult Intelligence Scale (WAIS) has had a long history of use with the visually disabled (Hayes, 1952). Only the verbal scale could be used and this was given in its entirety according to the administration procedures outlined by Wechsler (1955). This latter procedure was done, in spite of the fact that some researchers (Bauman & Hayes, 1951) have suggested modifications in the procedure. In all of the analyses, the scaled raw score was used. The second test, the Vocational Intelligence Scale for the Adult Blind (VISAB), was developed specifically for use with the project. This test has for its basic item unit a series of four geometric patterns in raised form. Illustrations of the test items can be found in Jones (1960, pp. 52-53). These raised forms are readily discernible through both touch and sight. They are constructed of masonite and plastic and are placed in rows on masonite boards. There are four forms or patterns in each row with each row constituting an item. Three of the four forms in any item are similar in some respect; the fourth is different. Differences may be due to size, shape, or overall configuration, but the task of the subject is always the same. He must discern which form is most unlike the other three. The final form of the test consists of 43 items arranged in ascending order of difficulty. The test took an hour to administer.

Special Skills. In the case of persons who are blind, the gathering of information through touch is one of the more effective substitutes for visual perception. The possibility that the accuracy and speed with which this tactual information could be assimilated would influence employment potential prompted the development and use of a Tactual Reconstruction Pegboard (Gruber, 1959). The test kit consists of an aluminum sheet, 12½" x 11", mounted on a bakelite plate of the same dimensions. A thin strip of aluminum divides the face sheet in half, and an equal number of peg holes are drilled into each half of the board. The test was administered in the following manner. Using one inch aluminum pegs, six individual patterns were constructed by the examiner on the half of the board opposite the subject's hand preference. The task of the subject was to reconstruct each pattern on the other half of the board using pegs located in a nearby wooden dish. Scores were recorded with regard to accuracy of construction, accuracy of location, and speed.

Using the same test format, a rate of placement score was also obtained by having the subject insert as many pegs as he could within a 90 second time limit. The average time for administration of both parts was 30 minutes.

Another test falling into the special skills category was a measure of kinesthesis developed by Frohman (1950). The Asher-Frohman Maze test used in the research is an asymmetrical finger maze with no blind alleys. The maze, which is placed on a 12 inch square piece of plastic, consists of a configuration of ¼ inch recessed grooves. The starting point is near the center of the maze configuration. The person taking the test placed his forefinger in the starting groove and traced the maze to its completion. Upon reaching the end, a pointer, which can be rotated through 360 degrees, was inserted in a pivot at the terminal point. The subject's task was to rotate the pointer and turn it until it was pointed in the direction from which he started. His deviation from the true direction was obtained (in degrees) by reference to a calibrated circle printed under the pointer. The direction of the exact starting point is marked 0 degrees. Of all of the performance tasks required in the testing battery, this one alone made use of a shield to prevent vision from being used. It was anticipated that an advantage would thus be given to the totally blind (Russell, 1952) but the nature of the task precluded the use of vision. The test was administered by giving the maze four times in the same position. No time limit was imposed on the subject. The average time for administration was twenty minutes.

Other Testing Instruments

The rest of the testing battery consisted of three "tailor-made" personality instruments. All of the responses to these instruments were tape recorded in their entirety.

The Sound Test. This instrument consists of a series of 15 sound situations presented to the subject via a high-fidelity recording. The content of the sounds consisted primarily of human voices against a background of natural and mechanical noise. They vary in length from 20 to 50 seconds. Some of them are quite clear in meaning, others are ambiguous. The subject was instructed to listen to each sound and tell the researcher what the sound meant to him or what he thought it was. He was further instructed to tell a story about it if he wished.

The Personal Interview. This technique consists of a series of 68 questions designed to tap attitudes toward family and friends, religious beliefs, personal philosophies, and reactions to the rehabilitation process and employment. It contains many questions dealing with problems peculiar to the loss of sight.

The Sentence Completion Blank. In administering the blank, 60 unfinished sentence stems were presented to the subject in the form of unresolved conflicts and problems. They arose in the context of everyday activities. The subject was asked to complete the sentence by stating what he would say or do to solve the problems or how he would feel if he encountered them.

Scoring systems for the above techniques are still being developed and evaluated. In their present form, they consist primarily of categorical data. It is hoped that by quantifying the categories and items, validity analyses can be made of performance examined in the light of other test data and personal information.

THE THESIS RESEARCH STUDY

As has been shown earlier, research in the area of human blindness has been conducted under a variety of conditions with samples which have differed considerably in composition. Results of the various research efforts have sometimes shown the totally blind to be superior to the partially sighted and normal individual. In other studies, the extent of the disability has not seemed to make any difference. When the instruments used in this research were being developed, these findings were kept in mind as formats were chosen, vision control procedures were considered, and various methods for scoring the tests were developed.

The question uppermost in the minds of the Purdue research team concerned the effect that remaining vision would have on the factor structure of the performance tests. It was still to be ascertained whether or not the absence of external controls resulted in a test measuring the same variables to the same extent regardless of the vision level of the subject taking it.

It should be noted that a more crucial investigation of the effects of external vision controls would involve the use of separate groups of individuals. Each group would receive the same test instruments under a different method of control. The nature of the project and the initial intent of the research did not permit this to be done. The Asher-Frohman Maze, however, was given under artificial control conditions. It was hoped that the performance trends indicated in this test would shed some light on the effects of the use of shielding procedures.

Methodology and Procedure

In order to investigate the influence of vision differences on the test battery, the project sample was divided into three homogeneous subgroups based on the amount of remaining vision of the clients. Those test variables whose data were in a form which would permit parametric manipulation were selected and a principle components factor analysis was carried out for each vision group.

The Vision Groups

The total range of vision loss in the project sample was 20 per cent. The upper limit of remaining vision was a Snellen acuity of 20/200, or a loss of 80 per cent. The lower limit was total blindness, or 100 per cent loss. On the basis of the data collected in the Biographical Data Blank, three vision groups were formed. Individuals whose loss ranged from 20/200 through 20/280 were placed in a High Vision Group. The vision loss of these persons ranged from 80 to 90 per cent. Individuals with Snellen acuities between 20/290 and Object Perception (O.P.) formed a Mid-Vision Group. Percentage loss of these individuals ranged from 91 through 99 per cent. This middle group contained individuals with a vision loss too extensive for conventional Snellen measurements to be made. A traditional method of categorizing these persons is to use such descriptive notations as, "Count Fingers" (C.F.), "Hand Movement" (H.M.), and "Object Perception" (O.P.). The first term is used if the person is able to count the number of fingers held up by the vision examiner at distances ranging from 1 inch to 5 feet. Hand movement is used when the individual cannot perceive details as fine as individual fingers, but can perceive the movement of an object as small as the human hand. The third notation, Object Perception, refers to the ability to perceive only large objects.

The last group, the Low Vision Group, contained those persons who were completely without vision. Two descriptive measures were used in this group, "Light Perception" (L.P.) and "Total Blindness" (T.B.). The former refers to a visual condition characterized by the ability to perceive only a light source and possibly to identify the direction from which it comes. The latter category is self-explanatory. For classification purposes, these two notations were grouped together since they were functionally equivalent with regard to the use of vision cues on the tests. The format for the collection and classification of these data is shown in

Figure 1. If no vision data were available on a subject, he was omitted from the sample.

The Factor Analysis Battery

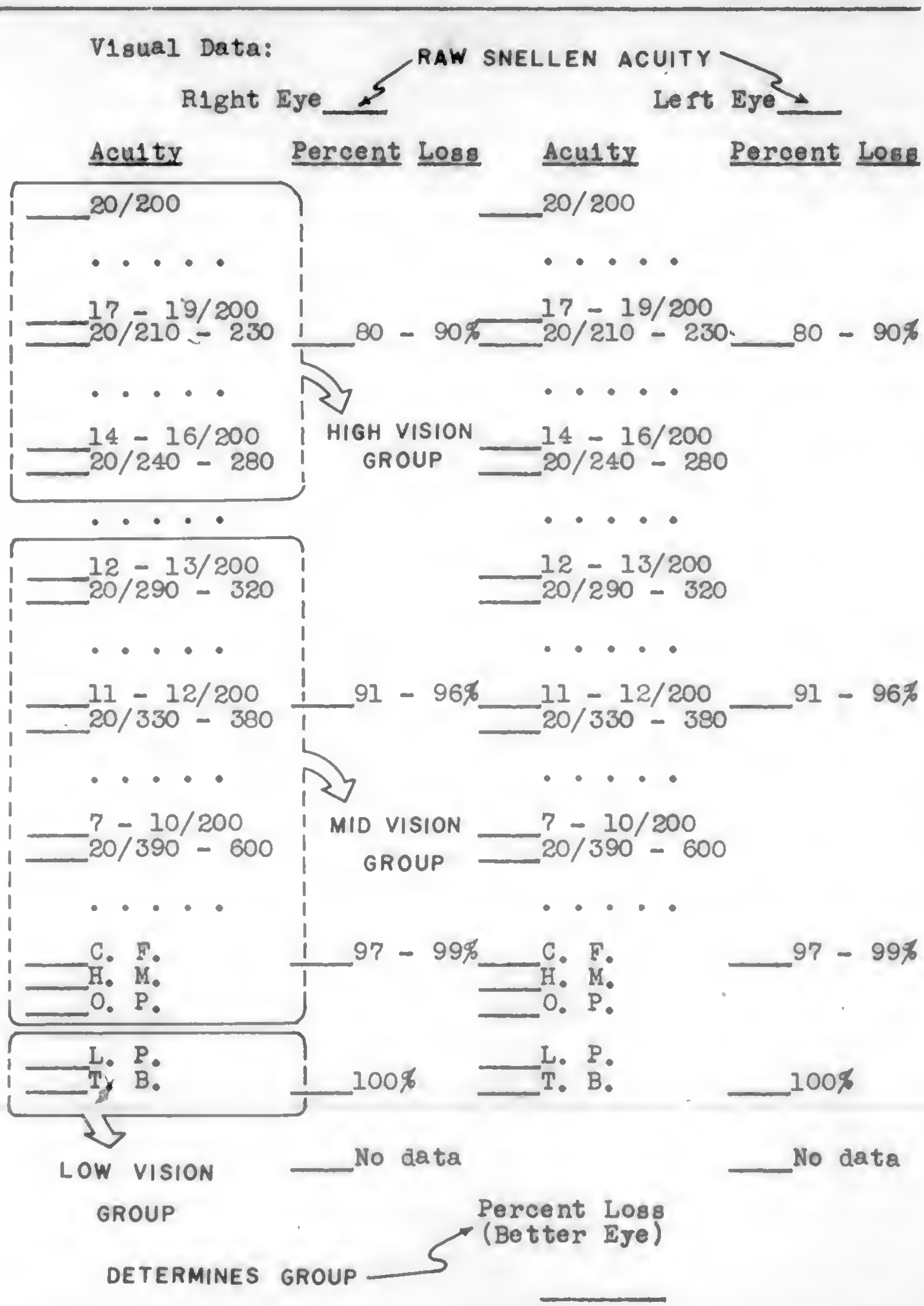
The instruments used in the project test battery have been described in an earlier section. With a few changes, these were the variables used in the factor analysis procedure. The manner in which the factor analysis battery differed from the original data will be discussed here briefly.

The three personality tests, the _Sound Test_, _Sentence Completion Blank_, and _Diagnostic Interview_, were not in a form which met the requirements of a factor analysis and were therefore omitted from the battery.

In the original scoring system of the _Tactual Imagery Pegboard_, a composite score was used. It was comprised of a separate time and accuracy score combined in such a way so as to give the highest number of points to accurate items constructed in a short period of time. Since it was felt that time and accuracy performance would be of interest in their own right, the original time and accuracy raw scores were used as well as the composite. There are thus three scores associated with the TRP.

Additional Data

In the course of any research, criteria are usually developed and evaluated. This was true of the Purdue



Visual Data:

Right Eye ____ Left Eye ____

Acuity	Percent Loss	Acuity	Percent Loss
____20/200		____20/200	
. . . . . .		. . . . . .	
____17 - 19/200 ____20/210 - 230	____80 - 90%	____17 - 19/200 ____20/210 - 230	____80 - 90%
. . . . . .		. . . . . .	
____14 - 16/200 ____20/240 - 280		____14 - 16/200 ____20/240 - 280	
. . . . . .		. . . . . .	
____12 - 13/200 ____20/290 - 320		____12 - 13/200 ____20/290 - 320	
. . . . . .		. . . . . .	
____11 - 12/200 ____20/330 - 380	____91 - 96%	____11 - 12/200 ____20/330 - 380	____91 - 96%
. . . . . .		. . . . . .	
____7 - 10/200 ____20/390 - 600		____7 - 10/200 ____20/390 - 600	
. . . . . .		. . . . . .	
____C. F. ____H. M. ____O. P.	____97 - 99%	____C. F. ____H. M. ____O. P.	____97 - 99%
____L. P. ____T. B.	____100%	____L. P. ____T. B.	____100%
	____No data		____No data

Percent Loss
(Better Eye)

____

Fig. 1. Format of the vision data.

research project as well. These criterion data consisted of directly observed (salary, tenure) and derived (ratings, job scales) measures of vocational and occupational success. The ones which were used in the factor analysis are described below.

Salary. The majority of the individuals who were employed were working in jobs paying on a piece-rate basis. For this reason, the amount which they earned each week reflected fairly well their expenditure of energy in terms of production output. This salary figure, before tax deductions, was recorded in the *Biographical Data Blank* and was included, along with the test scores, as an independent estimate of job effectiveness.

Job Hierarchy Value. For the most part, the criterion measures readily available to the project reflected features common only to the area, department, or industry in which they were collected. It was desirable to obtain a measure of vocational success which was more general in nature. This criterion should be applicable to all jobs, white-collar, or production, managerial or professional, regardless of where they were performed. For this reason, the *Job Hierarchy Scale* was developed.

Detailed descriptions of the jobs held by the clients were gathered at the time of testing. These descriptions were usually tape recorded and at a later date, they were transcribed and inserted into the appropriate data sheets.

From these job descriptions, 457 in all, 31 nominal categories of jobs were derived. These jobs were grouped as a function of task similarity. Eight independent raters pair-compared all 31 categories using representative job descriptions from each one. In each comparison, the rater selected the one job which he considered to be representative of greater vocational achievement. From these preference values, scale points were assigned in the manner outlined by Guilford (1954, pp. 160-163). The subjects were then given a job hierarchy score corresponding to the scale value of the job classification in which his position belonged. Kendall's coefficient of concordance (W) was used to yield an estimate of interrater reliability. W was found to be .92 and when converted to an average Rho, a value of .91 was obtained. The 31 job classifications, the representative job descriptions, and their assigned scale values can be found in Jones (1960, pp. 62-65). This Job Hierarchy Value is the second of the two criterion measures used in the factor analysis battery.

Age of Onset. The last variable included in the battery was the age in years at which the individual lost his vision. This variable was of interest because it was felt that if adaptation and learning take place as a result of sensory loss, the time of loss would contribute variation to test performance and perhaps influence subsequent vocational achievement as well.

The Factor Analysis Sample

Each individual included in the sample had to have completed all of the tasks in the project battery. These tasks included the Tactual Reconstruction Pegboard and the Rate of Placement tests, the Asher-Frohman Maze, the WAIS, and VISAB. Aside from these test data, vision and onset information, a Job Hierarchy Score, and a salary figure were needed for each person.

Complete information was not available for everyone. Testing conditions sometimes dictated that part of the battery be omitted and the available medical records were far from complete. As a result, the sample used in the factor analysis consisted of 450 individuals. Table 2 shows the number and average age of the individuals in each sub-group.

Table 2

Size and Average Age of the Vision Groups

	N	Average Age
High Vision	97	36.95
Mid Vision	147	35.90
Low Vision	206	33.69

The Factor Analysis Procedures

Preliminary Investigations. An intercorrelation matrix was generated for each of the three vision groups. The mean and variance of each variable was also obtained. An inspection of the means indicated some systematic tendencies with regard to the performance of the three groups on each of the ten variables. A single classification unweighted means analysis of variance was run on each variable. The significance level for the over-all F's are shown in Table 3. The groups differed significantly on all variables except the WAIS, Job Hierarchy, and Salary.

In general, the pattern of mean performance level is consistent. On those performance tests where vision is allowed, the level of attainment of the High Vision group is the best of the three. With few exceptions, the Mid-Vision and Low Vision groups decrease in order of vision loss. It should be noted that the TRP-Time score is recorded in the number of seconds necessary to complete the tasks. Hence, the smaller the score the shorter the time to completion.

One test, the Asher-Frohman Maze, was given under artificial vision control conditions. The group means do not conform to the pattern of the other performance tasks. The score is recorded in the total number of degrees deviation from the origin. In this case then, a smaller score indicates a more accurate performance in estimating the direction

Table 3

Means and Significance Levels of the Vision Groups

Variable	High Vision (N=97)	Mid-Vision (N=147)	Low Vision (N=206)	Significance Level
TRP-Composite	350.25	294.68	250.16	**
TRP-Time	477.98	728.81	1,197.63	**
TRP-Accuracy	60.24	56.23	53.68	**
WAIS-Total Score	66.25	65.73	69.77	--
Asher-Frohman	148.95	128.24	118.11	*
Rate of Placement	28.04	25.98	24.16	**
VISAB	31.40	28.31	28.39	**
Onset Age	8.58	10.48	13.65	**
Salary	50.57	47.92	52.07	--
Job Hierarchy	39.18	38.03	41.84	--

*Significance at the .05 level.

**Significance at the .01 level.

--Non-significance.

of the starting point. The ordering of means is reversed with the Low Vision group turning in the best performance. These data are in accordance with the results of Russell (1952). It is still not clear whether the results are due to the superior kinesthetic ability of the totally blind or to the effects of removing the visual cues of the partially sighted subjects.

Although the results were not significant, the pattern of means of the WAIS data and the two criterion measures are of interest and are worth noting. There is a tendency for the Low Vision group to be superior on all three variables. A more interesting observation is the fact that the Low Vision group tends to be the lowest of the three. Again this is true of all three variables. In a later section of this thesis, a detailed analysis of the Job Hierarchy data is described. This phenomenon will be discussed at that time.

It should be mentioned that the above analyses were fairly rough estimates of the performance of the three groups. The summary tables for these data are presented in Appendix C.

The Intercorrelation Matrices. Three 10 x 10 intercorrelation matrices are shown in Tables 4, 5, and 6. Only the entries above the main diagonals are shown and all decimal points have been omitted. These three matrices served as inputs for the principle components factor analysis. The communality estimate for variable j is the square of the multiple correlation between variable j and the other n-1 variables in the matrix (Guttman, 1956). These estimates are the underlined entries in the main diagonal. The variables in the matrix are coded in the following manner:

(1) Tactual Reconstruction Pegboard - Composite Score
(2) Tactual Reconstruction Pegboard - Time Score
(3) Tactual Reconstruction Pegboard - Accuracy

Table 4

10 x 10 Intercorrelation Matrix with Communalities Underlined - High Vision

	1	2	3	4	5	6	7	8	9	10
TRP	8904	-7950	8683	3757	-1472	5795	6933	0619	2742	1286
		7129	-5880	-2209	2232	-5705	-5171	-0546	-2035	-1247
			8198	4717	-0698	5311	6641	0377	3548	1883
WAIS				4689	-1050	1409	5025	1649	4572	4984
AF					1333	-0246	-1750	0290	-1158	-0211
RATE						4633	2944	-0772	2672	1447
VISAB							5915	1506	4147	2882
ONSET								2413	2775	0548
CRIT.									7408	7810
										7156

Table 5

10 x 10 Intercorrelation Matrix with Communalities Underlined - Mid-Vision

	1	2	3	4	5	6	7	8	9	10
TRP	9130	-7526	8710	4855	-2861	6872	7075	-2673	3241	2024
		6984	-4980	-2712	1826	-5824	-4787	3617	-2343	-1149
			8373	5432	-3096	5557	6754	-2052	2642	1625
WAIS				5355	-2004	3333	6388	-0701	4591	4314
AF					1216	-1427	-2687	1334	-1817	-1601
RATE						4991	4651	-2574	2602	1176
VISAB							6226	-1347	3806	2582
ONSET								2051	-0810	-1935
CRIT.									5313	6780
										5312

Table 6

10 x 10 Intercorrelation Matrix with Communalities Underlined - Low Vision

	1	2	3	4	5	6	7	8	9	10
TRP	9166	-7447	9258	6222	-3120	6352	6995	-4227	3696	3072
		7184	-6136	-5283	1174	-5778	-6183	3895	-1187	-2333
			8782	6234	-3099	5812	6729	-3675	3766	2939
WAIS				5907	-2602	3985	6911	-2754	5104	4381
AF					1683	-1408	-3150	0725	-1447	-0986
RATE						4740	4410	-4701	2241	2524
VISAB							6353	-2614	4191	3671
ONSET								2945	-2795	-2998
CRIT.									6551	7260
										5669

(4) WAIS - Total Scaled Raw Score Equivalents

(5) Asher-Frohman Maze Accuracy Score

(6) Rate of Placement Score

(7) VISAB Score

(8) Age of Onset of Blindness (in years)

(9) Salary per Week

(10) Job Hierarchy Score.

RESULTS

Factor Loadings and Communalities

The principle components factor analysis gave three factors which accounted for the bulk of the common factor variance in all three matrices. The latent roots and unrotated factor loadings are presented in Appendix D. Rotation was carried out by means of the orthogonal varimax criterion (Kaiser, 1958). Tables 7, 8, and 9 present the rotated factor loadings of the three matrices. The estimated and actual communality values (h^2) of each variable are presented next to its loadings on the three factors.

Table 7

High Vision Group-Rotated Loadings

		I	II	III	h^2	Est. h^2
TRP	1.	.956	.081	.128	.9369	.8904
	2.	-.813	-.096	.089	.6781	.7129
	3.	.840	.169	.222	.7834	.8198
WAIS	4.	.306	.435	.441	.4773	.4689
AF	5.	-.159	-.039	-.066	.0312	.1333
RATE	6.	.622	.199	-.275	.5021	.4633
VISAB	7.	.632	.242	.412	.6277	.5915
ONSET	8.	-.001	.111	.358	.1405	.2413
CRIT.	9.	.192	.826	.225	.7698	.7408
	10.	.046	.863	.113	.7597	.7156

Table 8

Mid Vision Group-Rotated Loadings

		I	II	III	h^2	Est. h^2
TRP	1.	.776	.091	.577	.9434	.9130
	2.	-.384	-.045	-.749	.7105	.6984
	3.	.860	.070	.283	.8246	.8373
WAIS	4.	.597	.467	.016	.5747	.5355
AF	5.	-.264	-.153	-.119	.1073	.1216
RATE	6.	.471	.070	.527	.5045	.4991
VISAB	7.	.736	.269	.199	.6536	.6226
ONSET	8.	-.043	-.104	-.440	.2063	.2051
CRIT.	9.	.230	.740	.152	.6236	.5313
	10.	.079	.775	.103	.6175	.5312

Table 9

Low Vision Group-Rotated Loadings

		I	II	III	h^2	Est. h^2
TRP	1.	.651	.147	.689	.9201	.9166
	2.	-.374	-.019	-.743	.6923	.7184
	3.	.697	.162	.568	.8347	.8782
WAIS	4.	.576	.410	.332	.6101	.5907
AF	5.	-.401	-.071	-.033	.1669	.1683
RATE	6.	.220	.136	.679	.5279	.4740
VISAB	7.	.655	.284	.388	.6602	.6353
ONSET	8.	-.025	-.251	-.530	.3445	.2945
CRIT.	9.	.235	.814	.100	.7278	.6551
	10.	.110	.760	.195	.6277	.5669

The communality values may be considered as the proportion of the variance of variable j that can be predicted from factors common to two or more variables in the matrix. For this reason, it is not surprising to find that the communality value of the TRP-Composite score is the largest in each of the three matrices. It consists of the combination of the Time and Accuracy scores and may be predicted quite well from the knowledge of these two separate variables. For the same reason, the Time and Accuracy scores have high communalities. The two criterion measures, Salary and Job Hierarchy have communality values which are quite high. Since the two measures were highly correlated, this is not surprising. The WAIS, Rate, and VISAB have communalities which range from .4773 to .6602 in value. Two variables, the Asher-Frohman Maze and Age of Onset, have very small values as compared with the other eight. It may be noted that the communalities of both these variables tend to increase in value as vision level decreases. This is particularly true of Age of Onset with values of .1405, .2063, and .3445 in the High, Mid, and Low Vision groups respectively. This can be interpreted as indicating that the influence of onset age changes as vision level decreases. Inspection of the intercorrelation matrices reveals that the correlations between onset age and the TRP-Composite increase from .0619 in the High Vision group to -.4227 in the Low group. The TRP-Accuracy-Age of Onset correlations range from .0377 in the High Vision group to -.3675 in the Low Vision group. The validity of the Age of Onset variable also increases with vision loss, that is, its correlation with variable ten (Job Hierarchy) is raised from .0548 at the High vision level to .2998 in the Low Vision group. In the latter group, its validity is comparable to that of the TRP-Composite and the Rate of Placement.

Interpretation of the Factors

High Vision. In the High Vision group, Factor I accounts for 56.61 per cent of the common factor variance of the battery. This percentage value was obtained by summing the squared factor loadings and dividing by the sum of the h^2 values. Six tests have their highest loadings on the factor. These are the three TRP sub-scores, the Maze, the Rate, and VISAB. The factor loading of the Maze, though small, accounts for over 81 per cent of that variable's common variance. These tests all require the use of the hands and the medium of touch for obtaining cues to the positions and locations of the patterns and forms involved. The speed with which these operations are carried out is important. This is indicated by the loadings of the TRP-Time score and the Rate of Placement. The only other loading of any size is that of the WAIS.

Factor I, therefore, is made up of performance measures having as a common task requirement the accurate perception of forms, configurations, and spatial relationships. The rapid manipulation of materials is also required. Some cognitive ability is involved (as indicated by the *WAIS* loading), but the factor is defined primarily by the loadings of the tactual performance tests. It has therefore been labeled "Tactual Perceptiveness."

Factor II, which accounts for 31.06 per cent of the common factor variance, is clearly defined by the two criterion measures. It has been labeled "Occupational Success." The fact that the *WAIS* is the only other variable with a loading of any size may be explained in a number of ways. The use of verbal intelligence measures to make rehabilitation decisions is a procedure of long standing. While few clients had taken the revised *WAIS* (1955) prior to the project testing, many had either taken earlier revisions or some other form of verbal ability test. It is entirely possible that job placement decisions had already been made on the basis of these earlier testings and these were reflected in the high validity of the *WAIS*. There is also the possibility that the criterion measure, *Job Hierarchy*, had intelligence built into it by those who scaled the jobs. A more parsimonious explanation than either of the above would be to assume that when one is predicting job levels which range from day laborers to attorneys, verbal intelligence will play a major role.

Factor III, which accounts for only 12.43 per cent of the common factor variance, is defined primarily by the loadings of the WAIS, VISAB, and Age of Onset. Since the variance of the onset variable is accounted for almost exclusively by Factor III, this factor has been labeled "Onset Age."

In Factor III, the signs of the factor loadings of WAIS and VISAB indicate that as the onset of blindness occurs later in life, the intelligence test scores have a tendency to increase. This could be explained in terms of the effect that blindness has on the education process. If onset occurs during the time an individual is in school, it typically results in a disruption of education until the basic information gathering tools of braille and typing are mastered and can be applied efficiently to the material to be learned. The net result might be a curtailment of functional intelligence.

Mid-Vision. Factor I is still responsible for most of the common factor variance of the battery. As in the High Vision group, the performance tests still load heavily on it. The TRP-Time and Rate of Placement loadings have dropped quite a bit which indicates that the importance of speed and manipulative ability has been reduced. The loadings of the two intelligence measures, WAIS and VISAB, have increased. The structure of Factor I has become more cognitive in nature. The increase in the factor loading of the Asher-Frohman Maze may indicate that more kinesthetic cues are being used to obtain information. Factor I, in the

Mid-Vision group, has been labeled "Verbal and Kinesthetic."

Factor II remains essentially the same as in the High Vision group. It is again defined primarily by the two criterion measures and it has been labeled "Occupational Success." The *WAIS* still has a high loading on it. This is a reflection of the fact that it is consistently the best predictor of job success regardless of vision level. The only change in the structure of the "Occupational Success" factor is an increase in the loading of the *Asher-Frohman Maze*. This suggests kinesthetic cues have a relatively more important role in communication for this group.

Factor III is defined by the loadings of the *TRP-Time*, *Rate of Placement*, and *Age of Onset* variables. Because it still accounts for almost all of the variance of the *Age of Onset* variable, the "Onset Age" label has been retained. The loadings of the intelligence tests have dropped and have been replaced by those of the speeded variables. The signs of the factor loadings of the *TRP-Time* and *Rate of Placement* variables (see Table 8) indicate that as onset occurs earlier, the speed of performance is increased.

Low Vision. As Table 9 indicates, Factor I is defined by the *TRP-Composite* and *Accuracy* loadings and those of the *Asher-Frohman Maze*, the *WAIS*, and *VISAB*. It is similar to the "Verbal and Kinesthetic" factor defined in the Mid-Vision group. In the Low Vision group, however, the kinesthetic ability indicated by the *Asher-Frohman Maze* loading has increased in importance and speed loadings have all but disappeared. Factor I is comprised of tests which measure intellectual ability, accuracy, spatial relations, and kinesthesis. Because of the importance of intellective functions, the "Verbal and Kinesthetic" label is retained.

Factor II is still defined primarily by the criterion variables of Salary and Job Hierarchy. Again, the WAIS has a moderately high loading on it. This factor is the "Occupational Success" factor that was defined in the first two vision groups. It will be noted that the factor loading of the Age of Onset variable has increased. This had been anticipated since the validity of this variable increased as vision level dropped.

The last factor is most heavily weighted with the speed variables that were characteristic of the "Onset Age" factor in the Mid-Vision group. It also accounts for most of the variance of the Age of Onset variable. It had been noted previously that as vision decreased, the communality of the Age of Onset variable increased as did its intercorrelations with the other variables in the battery. It should be expected that the factor accounting for the bulk of the Age of Onset variance would contain appreciable loadings of some of the other variables. Factor III fits this description and has therefore been labeled "Onset Age."

SUMMARY AND CONCLUSIONS OF THE FACTOR ANALYSIS

At each level of vision, three factors accounted for the bulk of the common factor variance of the battery. A residual matrix for each vision group may be found in Appendix E.

In the High Vision group, Factor I was labeled "Tactual Perceptiveness." Its structure was defined primarily by the tactual performance and speed variables. Factor II was labeled "Occupational Success" because of the role that the two criterion measures played in determining its structure. Factor III was designated as an "Onset Age" factor.

In the Mid-Vision group, the structure of Factor I changed. The intelligence measures contributed more to its make-up and the speed variables decreased in importance. In this group, Factor I was called "Verbal and Kinesthetic." The composition of Factor II remained essentially the same and it was again called "Occupational Success." Factor III contained the speed variables which were previously found in Factor I. Because Age of Onset was still important in determining its structure, it was labeled "Onset Age."

At the Low Vision level, Factor I consisted primarily of intelligence and kinesthetic measures. Speed of performance was almost completely absent from its composition. Because of the importance of intelligence, the "Verbal and

Kinesthetic" label was retained. As in the other groups, Factor II was designated "Occupational Success." The structure of Factor III was heavily weighted with speed and performance loadings as well as that of the Age of Onset variable. The "Onset Age" label was retained for this factor.

In general, as the group vision level decreased the three factors accounted for more equal proportions of the common factor variance of the battery. The effects of the age at which vision was lost were quite interesting. It should be recalled from the Table of Means (Table 3) that as vision level decreased there was a consistent and significant decrease in the mean scores of the performance tests. It should also be remembered that, on the average, blindness occurred significantly later in life in the lower vision groups. The factor analysis revealed a tendency for scores on the performance tests (TRP, Rate) to be lowered as onset occurred later in life. This was particularly true of the two lower vision groups. In light of this, it may be speculated that the drop in the average performance level of the Low and Mid-Vision groups might be due, in part, to the later occurrence of vision loss.

VISION AND JOB ATTAINMENT

Job Hierarchy Analysis

In the earlier sections of this thesis, factor analysis procedures were used to investigate the test performance of three vision groups. In the preliminary work prior to this investigation, a single classification unweighted means analysis of variance was run on each variable included in the factor analysis battery. Vision level was the only treatment considered. The results of these analyses indicated that the performance test behavior decreased systematically as vision loss increased.

Age of onset definitely exerted an influence on the performance level of the tests. The fact that this influence was felt more strongly as vision decreased suggests a possible interaction effect. In certain of the variables, the WAIS, Salary, and Job Hierarchy, significant differences were not demonstrated. Under the assumption that onset age influences might have depressed the main effect of vision, it was decided to run a more detailed analysis incorporating age of onset as a treatment variable.

One other treatment was included in the analysis. Work done with animals undergoing sensory loss (Hebb, 1949; Riesen, 1947) has indicated that early environmental influences are of critical importance in determining adult performance. Since the analysis which was being contemplated already fit into the early experience context, a measure of socioeconomic status was added to the design. It was felt that this variable adequately reflected the early level of cultural enrichment of the individual. The Biographical Data Blank contained information pertaining to the occupational level of the male parent. This was the variable that was chosen.

The vision stratification remained the same as in the factor analysis; three levels of vision loss were used. Two categories were chosen for the onset variable: those individuals who were blind at birth, and those who lost their vision later. Parental occupation level was stratified into three categories: (1) Professional, (2) skilled, and (3) unskilled. The first category included those individuals whose parents were engaged in highly specialized occupations. Such jobs as lawyers, doctors, clergymen, artists, and musicians are typical of this level. Skilled parental occupations included technical workers, tradesmen, and skilled industrial workers. The last category was comprised of those clients whose parents were engaged in repetitive, manual labor which required no training.

The dependent variable chosen for study was the Job Hierarchy Scale value of each client. This was chosen since it represented, more than any other value, the end product of the rehabilitation process.

The result of the stratification was a 3 x 3 x 2 factorial involving three levels of vision, three parental occupation levels, and two onset levels.

It was felt that the job attainment level of the non-white clients might be affected by factors other than those under study and separate analysis would be more desirable. The absence of information about the male parent resulted in a small non-white sample with the consequence that many of the cells were empty. It was decided to use only the white individuals for analysis.

The stratification procedure resulted in a sample of 440 white clients who had complete data on the necessary variables. The number of individuals contained in any cell ranged from a low of seven to 69 as a maximum. Because of the differing cell frequencies, an unweighted means analysis of variance procedure was used. Essentially, this gave each cell mean equal weight regardless of the $\underline{n}$ upon which it is based. The error term was obtained by dividing the Mean Square Within value by the Harmonic Mean. Since all treatments were fixed, this term served as the denominator for all F ratios.

Table 10 shows the mean Job Hierarchy value for each cell and the number of observations (in parentheses) on which each mean is based.

Table 10

Mean Job Hierarchy Score

Parent's Occupation	High Vision		Mid-Vision		Low Vision		Row Mean
	Birth	Later	Birth	Later	Birth	Later	
Professional	50.25 (8)	48.43 (7)	29.40 (10)	41.72 (18)	53.10 (10)	47.14 (22)	45.01 (75)
Skilled	40.41 (27)	52.73 (15)	40.83 (24)	37.57 (21)	44.45 (29)	37.32 (69)	42.22 (185)
Unskilled	32.93 (26)	29.50 (12)	39.93 (30)	35.28 (32)	40.70 (22)	42.10 (58)	36.74 (180)
Column Mean	41.19 (61)	43.55 (34)	36.72 (64)	38.19 (71)	46.08 (61)	42.19 (149)	

RESULTS

The analysis of variance summary table of the data is presented in Table 11. The analysis showed that there was a significant difference in adult job attainment as a function of vision loss ($p < .01$). The observed mean performance levels did not decrease in a linear fashion as residual vision decreased; there is a drop in the performance level of the Mid-Vision group. These results were similar to the tendency hinted at in the earlier analyses. The quadratic component of this mean function was tested for significance and the resulting F ratio of 9.38 indicated that the Mid-Vision group had not attained as high a job level ($p < .01$) as either of the other two groups.

The three parental occupation groups also registered differences ($p < .01$) in job achievement. The Job Hierarchy score means decreased systematically as the skill level of the parent decreased.

The combined effects of vision loss and parental background were not always the same. That fact was indicated by the significance ($p < .01$) of the Vision x Parents interaction component. Figure 2 presents this interaction in graphic form. Inspection of the figure reveals that the mean performance profiles of the three separate parental

Table 11

ANOV Summary Table-Job Hierarchy

Source	SS	df	MS	F
Vision	143.734	2	71.867	5.016 **
Parents	212.222	2	106.111	7.406 **
Onset	.002	1	.002	.000 --
Vision x Parents	290.222	4	75.556	5.064 **
Vision x Onset	34.370	2	17.185	1.199 --
Parents x Onset	11.471	2	5.736	.400 --
Vision x Parents x Onset	173.878	4	43.469	3.034 *
Error	102,861.187	422	14.328(adj)	

*Significance at the .05 level.

**Significance at the .01 level.

--Non-significance.

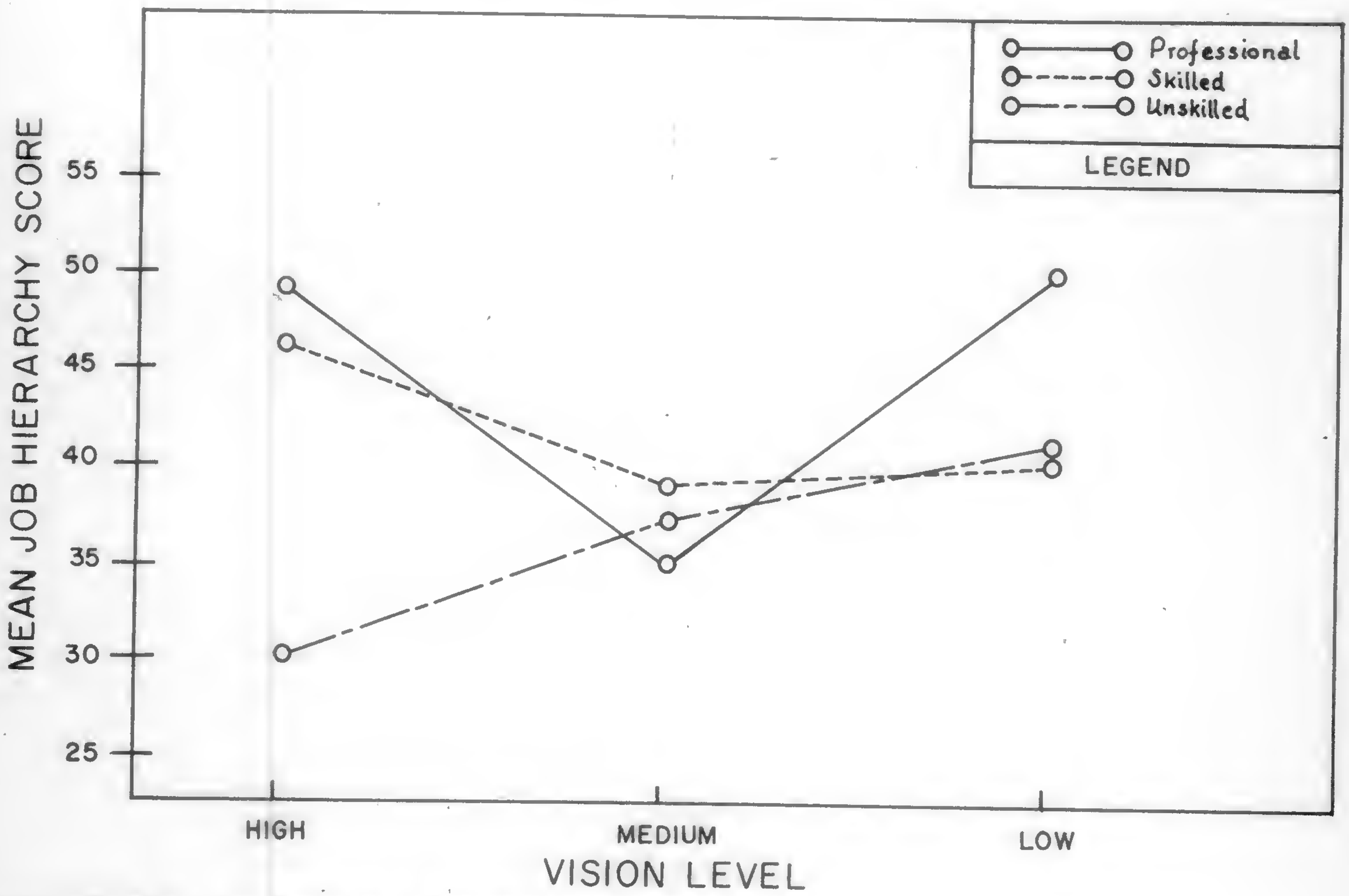


Fig. 2. Parents x Vision interaction.

groups differ quite markedly in shape. At the High Vision level, there is a significant difference between the parental occupation groups ($p < .01$). This significance is due to the unskilled group attaining markedly lower job placement than the other two parental groups. When vision loss is at the level of those in the Mid-Vision group, parental occupation makes no difference. When vision loss is complete, the offspring of professional parents attain much higher job placement ($p < .05$) than those coming from the other two home environments.

The analysis did not reveal any significant differences between the performance of those individuals who were blind at birth and those who went blind later in life. This interpretation of this result was rather tenuous in light of the significant triple order interaction ($p < .05$). Figures 3a and 3b show the profiles corresponding to the Parents x Vision interaction for the two different onset periods. These figures indicate that onset age exerts a differential effect on the combination of the other two variables.

Figure 3a shows the mean performance profiles of the three parental groups. They are plotted across all levels of vision and are based only on those individuals who were blind at birth. The clients with professional level parents exhibit an extremely sharp drop ($p < .01$) in the Mid-Vision range. The best performers are those in the two extreme

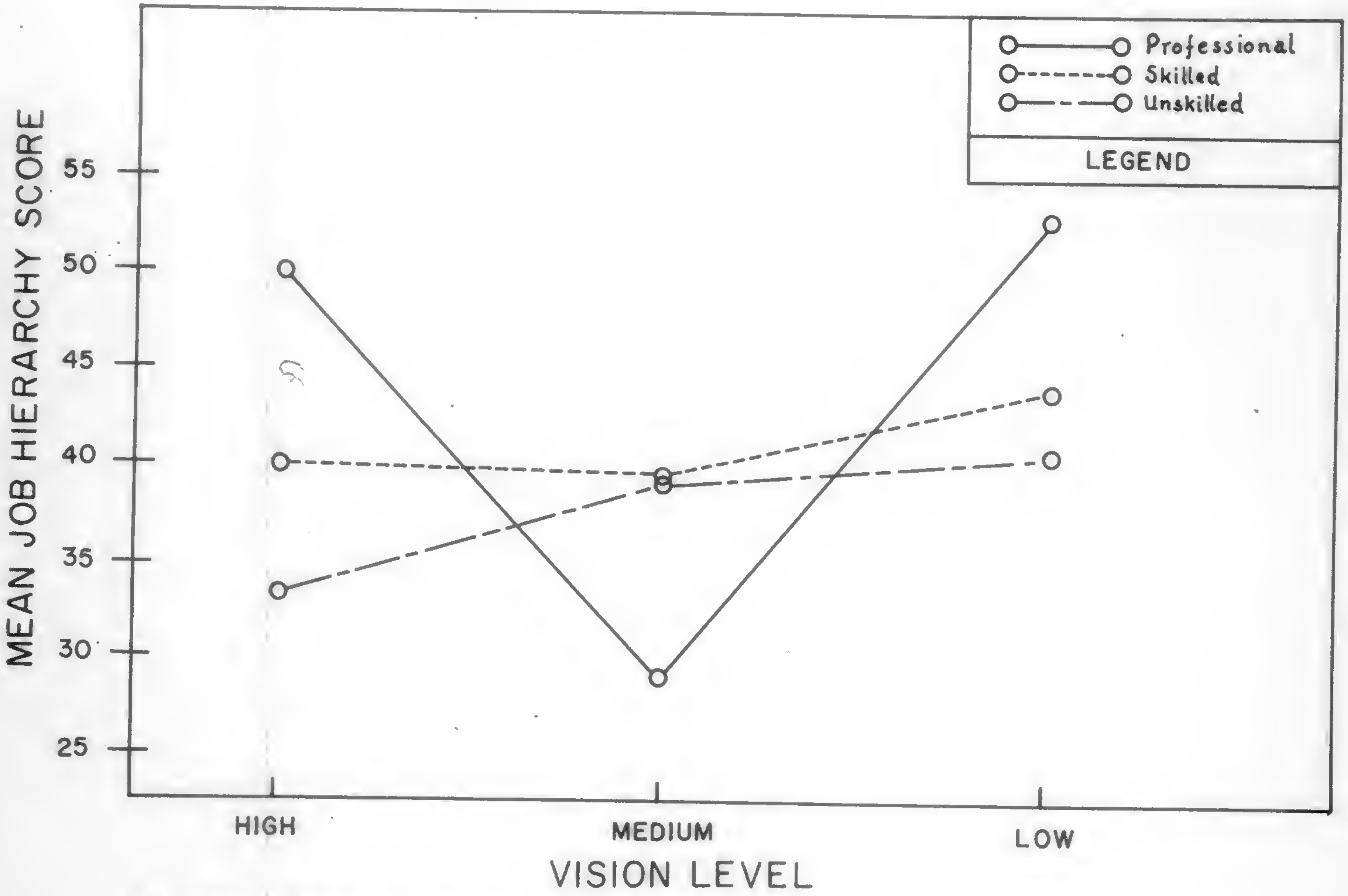


Fig. 3a. Parents x Vision interaction (birth only).

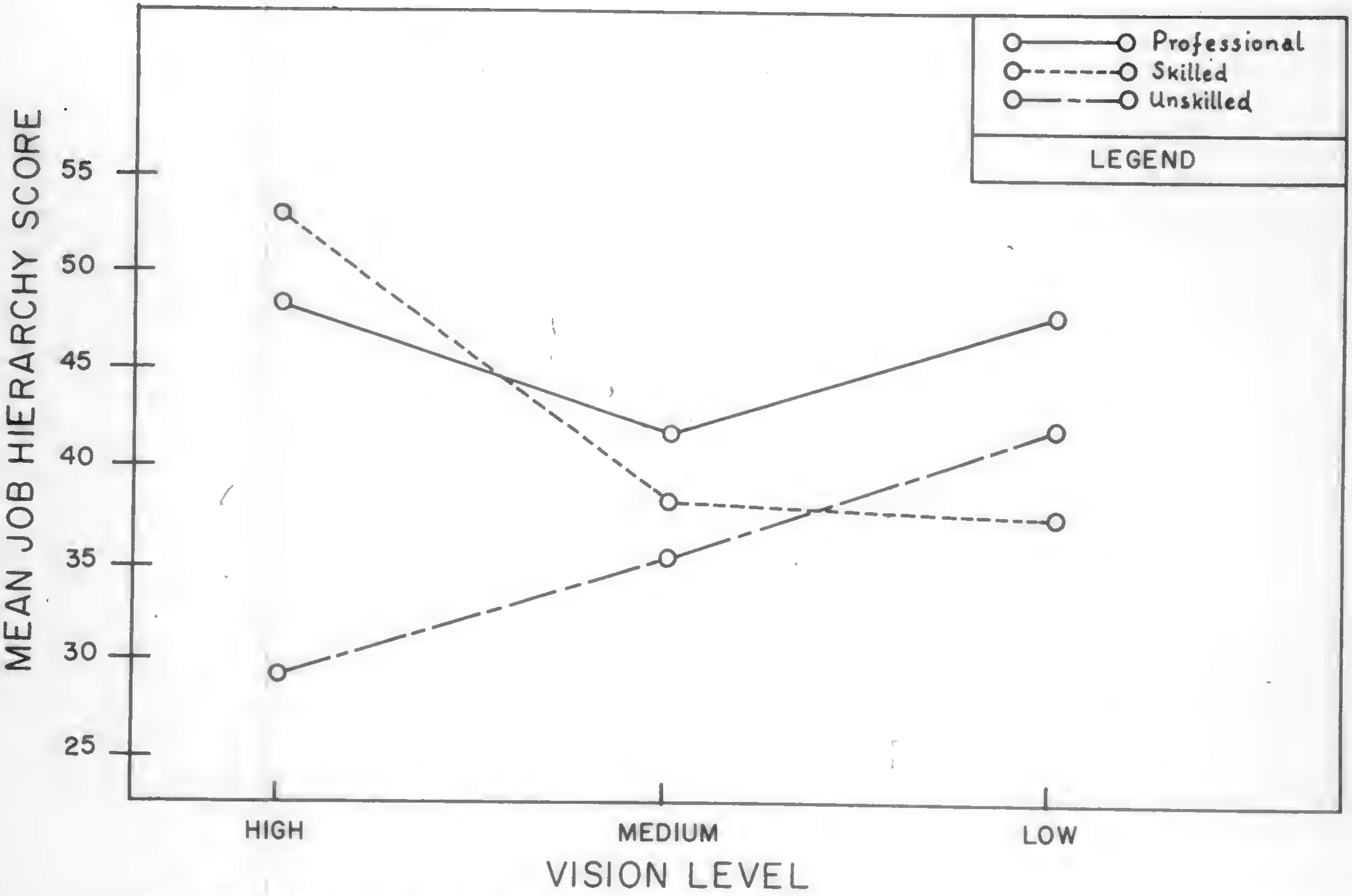


Fig. 3b. Parents x Vision interaction (late onset only).

groups. The offspring of skilled and unskilled parents do not exhibit significant differences in performance at any vision level.

When only those individuals with high vision are considered, Figure 3a reflects a significant ($p < .01$) decrease in job attainment as parental skills decrease. In the Mid-Vision group, significance is again attained but it is due to the poorer performance of the professional group when contrasted with the other two ($p < .01$). The difference between parental occupation groups at the low vision level is significant ($p < .01$). This is now due to the superior performance of those individuals coming from professional parents.

The profiles of the late-blinded individuals are shown in Figure 3b. In contrast to those individuals who were born blind, the late-blinded offspring of professional parents achieve equally well regardless of vision level. Again, there is a tendency for the Mid-Vision group to drop, but it is not significant. The group coming from the homes of skilled parents perform significantly better ($p < .01$) when vision is high than when it is of medium or total loss. When the parents are unskilled, those individuals with high vision perform significantly poorer ($p < .01$) than the totally blind clients from similar backgrounds.

At the high vision level, parental occupation makes a marked difference in adult performance; the offspring of unskilled parents are definitely ($p < .01$) inferior to the other two groups. At the medium vision level, performance of the three groups is compressed and parental background makes no difference. When vision loss is complete, the group coming from professional parents is superior to the others ($p < .05$).

GENERAL SUMMARY AND CONCLUSIONS

During the course of a three year research project concerned with investigating the employment potential of the visually disabled, a sample of 626 legally blind persons was tested and interviewed. The test battery consisted of special ability, personality, and intelligence measures. The systematic collection of personal history data and employment criteria accompanied the testing procedures.

The residual vision of the individuals tested ranged from 80 per cent loss to total blindness. Previous research indicated a need for determining whether the amount of remaining vision brought to the testing situation influenced the factor structure of the tests used in the research. To determine this, a sub-sample of 450 individuals was split up into High, Mid, and Low Vision groups. The High Vision group was comprised of 97 individuals whose remaining vision was classified as ranging from 80 to 90 per cent loss. The 147 persons in the Mid-Vision group had a vision loss of 91 to 99 per cent. The Low Vision group consisted of 206 totally blind individuals.

A principle components factor analysis was carried out on the test data of each vision group. The ten variables in the factor analysis battery consisted of a standard test of verbal intelligence (WAIS), a tactual intelligence scale (VISAB), a test of manipulative ability (Rate of Placement), and a measure of kinesthetic ability (Asher-Frohman Maze). A fifth test, a measure of tactual perceptiveness (TRP), was recorded in three scores: a time score, an accuracy score, and a weighted composite of the two. The remaining three variables were the age at which vision was lost (Age of Onset), and two measures of occupational success (Salary and Job Hierarchy).

The factor analysis gave three factors which accounted for the bulk of the common factor variance in each of the three groups. The structure of these factors changed systematically at the various vision levels. In the High Vision group, the first factor was called "Tactual Perceptiveness." At this vision level, its structure was quite specific and was defined primarily by the tactual performance tasks. As vision decreased, this factor accounted for decreasing amounts of the common factor variance of the battery. Its structure also became more cognitive in character. In the Mid and Low Vision groups, the tests requiring verbal and kinesthetic ability loaded heavily on it and assumed greater importance than did the loadings of the tactual performance tasks. In the two lower vision groups, the factor was called "Verbal and Kinesthetic."

The structure of the second factor, "Occupational Success," remained essentially the same at all vision levels. It was defined by the two criterion measures, Salary and Job Hierarchy. The only ability measure with consistent loadings of appreciable size on this factor was the WAIS. This was a reflection of its high validity regardless of vision level.

Factor III, "Onset Age," accounted for increasing amounts of the common factor variance as the vision level of the groups decreased. In the High Vision group, the WAIS had a moderately high loading on the "Onset Age" factor. The sign relationship of the WAIS loading indicated that as onset occurred later in life, WAIS scores tended to be higher. This was interpreted as reflecting the disruptive influence on education that is caused by onset of the disability during the school years. In the two lower vision groups, the "Onset Age" factor contained substantial loadings of the speed and performance measures. Here, the sign relationships indicated that late onset tended to exert a negative influence on speed of performance.

A second portion of the thesis dealt with the effects of vision loss, onset age, and early socioeconomic environment on the adult job attainment of the disabled individual. A sample of 440 persons was used in a 3 x 3 x 2 factorial unweighted means analysis of variance. The treatments consisted of three levels of vision loss, two levels of onset age, and three parental occupation levels.

The analysis revealed a complex interrelationship among the factors. Determination of the separate role of each variable was difficult because of the interactions. On the whole, parental background contributed in the anticipated manner. Those offspring from high socioeconomic backgrounds achieved higher placement than did those from the two lower levels. The effect of onset age was obscured by its interaction with the other two factors. Achievement was dependent upon parental background and the magnitude of the vision loss. In general, the mean performance of the Mid-Vision group was poorer than that of the other two groups. This was attributed to the rather ambiguous role the partially sighted individual plays in the world of the sighted.

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APPENDIX A

SAMPLE BREAKDOWN BY TESTING LOCATION

Table 12

Sample Breakdown by Testing Location

Location	N	Location	N
Indiana:		Illinois:	
Indianapolis	59	Chicago	133
Lafayette	5	Peoria	9
Fort Wayne	36	Rock Island	9
Evansville	21	Galesburg	5
Muncie	11	Springfield	9
Marion	6	Champaign	5
Missouri:		Ohio:	
St. Louis	68	Toledo	31
		Cleveland	21
New York:		Akron	10
New York City	143	Columbus	23
		Cincinnati	22

APPENDIX B

THE BIOGRAPHICAL DATA BLANK

BIOGRAPHICAL DATA SHEET

(circle one)
NAME ______________________ M F
CODE I.D. NUMBER

DATE ______________ LOCATION ______________ ___ ____ ___

CRITERION GROUPING

(1) GROUP
____1. competitive employment
____2. shop
____3. agency personnel
____4. vending stand
____5. unemployed
____6. part-time
____7. internal-use only
____8. cannot be used

CODE NUMBER (and sex)
(2) ____
3. ____
4. ____

TESTING LOCATION
(5) ____
6. ____

Col. Punches
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

PHYSICAL CHARACTERISTICS

(7) RACE
____4. white
____5. Negro
____6. Oriental
____7. Spanish origin (Mexican, Puerto Rican)
____8. other __________

AGE (in years)
(8) ____ (9) ____

HEIGHT (in inches)
(10) ____ (11) ____

(12) WEIGHT
____0. 99 or less
____1. 100-114
____2. 115-129
____3. 130-144
____4. 145-159
____5. 160-174
____6. 175-189
____7. 190-209
____8. 210-224
____9. 225 and more

7. ____
8. ____
9. ____
10. ____
11. ____
12. ____

PERSONAL BACKGROUND

(13) RELIGION
____4. Protestant
____5. Jewish
____6. R. Catholic
____7. other __________
____8. none

(14) MARITAL STATUS
____1. single
____2. married
____3. widowed
____4. divorced
____5. separated
____6. common-law

(15) NUMBER OF CHILDREN
____1. none
____2. one
____3. two
____4. three
____5. four
____6. five
____7. six
____8. seven
____9. eight or more

13. ____
14. ____
15. ____

PERSONAL BACKGROUND (cont.)

---

(16) LIVING WITH
____4. spouse (and children)
____5. parent(s)
____6. spouse and parent(s)
____7. alone
____8. friends or relatives
____9. institution

(18) EDUCATION
____1. more than 4 yrs. college
____2. college graduate
____3. some college education
____4. high school graduate
____5. some high school education
____6. grade school graduate
____7. grades 6-7
____8. grades 5 or less
____9. no formal education

(17) MILITARY SERVICE
____5. none
____6. service but no combat
____7. combat--W.W. II
____8. combat--Korea

(19) DEGREES
____3. none
____4. AB or BS
____5. MA or MS
____6. L.L.B.
____7. Ph.D., D. Ed.

(20) SCHOOLS FOR THE BLIND
____1. travel, rehab. training only
____2. never attended
____3. V.A. Rehab. only
____4. all education (formal)
____5. some grade school
____6. grade school only
____7. some high school
____8. high school only
____9. trade or business only

16. ____
17. ____
18. ____
19. ____
20. ____

---

(21) PARENTS LIVING
____5. mother living
____6. father living
____7. both living
____8. neither living

(22) NUMBER OF SIBLINGS
____1. none
____2. one
____3. two
____4. three
____5. four
____6. five
____7. six (or more)

(23) HOME LOCATION (younger life)
____1. farm
____2. village (2500 or less)
____3. town (2500 to 10,000)
____4. city (10,000 or more)
____5. suburb of large city

(24) FATHER'S OCCUPATION
____0. don't know
____1. professional, scientific
____2. religious
____3. artistic, music
____4. government (or politics)
____5. industrial (supervision)
____6. industrial (semi, unskilled)
____7. skilled tradesman
____8. agriculture
____9. laborer

(25) BLINDNESS IN FAMILY HISTORY
____1. no other blindness
____2. yes--mother
____3. yes--father
____4. yes--both
____5. yes--sibling(s)
____6. aunts, uncles, cousins
____7. grandparents

21. ____
22. ____
23. ____
24. ____
25. ____

TRAINING, FINANCIAL & OCCUPATIONAL STATUS

---

(26) TRAINING BACKGROUND
(formal only)

____1. pre-professional (medical, legal)
____2. business
____3. trade, mechanical
____4. musical (incl. music teaching)
____5. teaching (education)
____6. agricultural
____7. no specialty

(27) OCCUPATION BEFORE BLINDNESS

____0. no occupation—blind from birth
____1. laborer
____2. agricultural
____3. industrial (unskilled, semi)
____4. skilled tradesman
____5. industrial (management, supervision)
____6. artistic (including musician)
____7. teacher (including music)
____8. professional, scientific
____9. other ____________

(28) EXTENT OF PRESENT EMPLOYMENT

____2. unemployed
____3. part-time
____4. full-time } — self
____5. part-time
____6. full-time } — other
____7. part-time
____8. full-time } — at home

(29) DURATION OF EMPLOYMENT

____0. never employed
____1. unemployed 6 mos. or less
____2. unemployed 6-11 mos.
____3. unemployed 1yr.-23 mos.
____4. unemployed 2 yrs. or more
____5. employed 6 mos. or less
____6. employed 6-11 mos.
____7. employed 1 yr.-23 mos.
____8. employed 2 yrs. or more
____9. unemployed since blind

GROSS PAY (per week)

Cols:
(30) ____ (31) ____

code	
(31)	0-3
(32)	10-14
(33)	15-19
(34)	20-24
(41)	25-29
(42)	30-34
(43)	35-45
(44)	46-49
(51)	50-59
(52)	60-69
(53)	70-74
(54)	75-79
(61)	80-84
(62)	85-89
(63)	90-94
(64)	95-104
(71)	105-114
(72)	115-124
(73)	125-134
(74)	135-149
(75)	150 or more

26. ____
27. ____
28. ____
29. ____
30. ____
31. ____

GROSS PAY NOT KNOWN.
ABOVE FIGURE NET PAY

yes____ no____

FINANCIAL STATUS (cont.)

USE FOR NET PAY ADJUSTMENT
(if needed)

NUMBER OF PAY DEDUCTIONS _____

(32) INCOME OTHER THAN SALARY
____0. none
____1. Blind Assistance (BA) ______
____2. ADC _________
____3. B A & ADC ______
____4. welfare, relief ______
____5. insurance (compensation)
____6. military disability _________
____7. investments (stocks, bonds)
____8. real estate, property
____9. others ___________

(33) HOME STATUS
____2. owner
____3. renter
____4. roomer
____5. other _________

(34) IS CLIENT SUPPORTING HIMSELF?
____5. entirely
____6. partially
____7. not at all

(35) IS CLIENT SUPPORTING FAMILY?
____1. entirely
____2. partially
____3. not at all

(36) OTHERS EMPLOYED IN FAMILY
____0. none
____1. parents (if living with client)
____2. spouse
____3. children
____4. spouse & children

32. ____
33. ____
34. ____
35. ____
36. ____

---

(37) DOES CLIENT READ OR WRITE BRAILLE?
____3. no
yes:
____4. Grade 1,½
____5. Grade 2
____6. Grade 3

(38) READING FOR PASTIME
____1. uses braille for reading
____2. uses braille for business
____3. reads braille but doesn't use it
____4. reads braille and uses talking books
____5. no braille but uses talking books
____6. no braille--no reading

37. ____
38. ____
39. ____

(39) TYPE OF LITERATURE READ
____1. religious--Bible
____2. Reader's Digest (magazines)
____3. fiction, novels (popular)
____4. textbooks, classics
____5. newspapers
____6. more than one
____7. not applicable.

JOB DATA

Description of job: ____________________

JOB SLOTS
COLS. (40) ____ (41) ____

(42) JOB HIERARCHY

____1. Professional, Administration
Drs., lawyers, medical,
decision making, policy
formulation, personnel
function. 40. ____

____2. Counsellors, Home teachers
training, industrial 41. ____
supervision

____3. Clerical--white-collar, office 42. ____
switchboard, typists,
stenographers, librarians

____4. Technical, piano tuner
x-ray, darkroom

____5. Sales

____6. Mechanical--complex and/or
variety, machine and auto maintenance

____7. Repetitive and/or machine
broom winders, sewers,
stitchers, mats

____8. Simple assembly
packagers, sorters

____9. Unskilled--non-manufacturing
dishwashers, waitresses,
laborers

____0. Doesn't fit above,
not enough information

MEDICAL AND PSYCHOLOGICAL DATA

Visual Data:

Right Eye ________________

Acuity	% loss
____ 20/200	____(1) 80-90%
____ 17-19/200	
____ 20/210-230	
____ 14-16/200	
____ 20/240-280	
____ 12-13/200	____(2) 91-96%
____ 20/290-320	
____ 11-12/200	
____ 20/330-380	
____ 7-10/200	____(3) 97-99%
____ 20/390-600	
____ H. M.	
____ O. P.	
____ L. P.	____(4) L. P.
____ T. B.	____(5) T. B.
	____(6) No data

Left Eye ____________________

Acuity	% loss
____ 20/200	____(1) 80-90%
____ 17-19/200	
____ 20 /210-230	
____ 14-16/200	
____ 20/240-280	
____ 12-13/200	____(2) 91-96%
____ 20/290-320	
____ 11-12/200	
____ 20/330-380	
____ 7-10/200	____(3) 97-99%
____ 20/390-600	
____ H. M.	
____ O. P.	
____ L. P.	____(4) L. P.
____ T. B.	____(5) T. B.
	____(6) No data

______ AGE OF ONSET

Write in raw years __________

____(1) Birth
____(2) 1-5
____(3) 6-11
____(4) 12-18
____(5) 19-25
____(6) 26-33
____(7) 34-40
____(8) 41-49

% LOSS
(Better Eye)
(43) _____

AGE OF ONSET
(44) _____

VISUAL DATA

Diagnosis (Present Condition of the Eye)

	Medical Record				Verbal Report		
Specific Conditions	Right	Left	Both		Right	Left	Both
Retina							
Glioma (tumor of retina)							
Retinal detatchment							
Macular degeneration							
Retinal hemorrhage							
Retinitis pigmentosa							
Scarred retina							
Others....................							
Lens and Cornea							
Aphakia (absence of lens)							
Cataracts (secondary or otherwise)							
Opaguc cornea							
Scarred cornea							
Others							
Generalized Conditions							
Choroiditis							
Myopia (malignant or simple)							
Opthalmia (inflammation of eye)							
Optic Atrophy (or damage)							
Phthisis Bulbi (eye shrinkage)							
Secondary glaucoma							
Traumatic glaucoma							
Ulcer behind eye							
Others							
Postural Conditions							
Mystagmus							
Strabismus							
Others							
Surgical Correction							
Enucleated (eyes removed)							
Prosthesis (artificial eye)							
Others							

VISUAL DATA (cont.)

Cause: (Primary Reason for Blindness)

	Medical Record				Verbal Report		
	Right	Left	Both		Right	Left	Both
Non-organic							
Unknown							
Connected with military service							
Accidental							
Lack of silver nitrate							
Other (non. org.)							
Diseases Not of the Eye							
Venereal disease							
Diabetes							
Measles							
Diptheria							
Typhoid fever							
Meningitis							
Edema							
Brain tumor							
Scarlet fever							
Pneumonia							
Influenza							
Multiple sclerosis							
Others							
Specific Eye Conditions							
Glaucoma (cong.)							
Cataracts (cong.)							
Retinitis pigmentosa							
Amblyopia (defective retinal sensitivity)							
Retinal atrophy							
Lack of macule in retina							
Corneal dystrophy							
Aniridia (absence of iris)							
Undeveloped optic nerve							
Optic atrophy (or decay)							
Myopia (simple or malignant)							
Others							
General Eye Condition							
Absence of Eyeballs							
Eye infection							
Eye tumor (or growth)							
No pigment (albinism)							
Phthisis bulbi (eye shrinkage)							
Eye did not develop							
Others							

APPENDIX C

ANOV SUMMARY TABLE - ANALYSIS OF VISION GROUPS

Table 13

ANOV Summary Table - Analysis of Vision Groups

(1) TRP - Composite

Source	SS	DF	MS	F
Between	5,029.350	2	2,514.675	55.640**
Within	2,767,395.794	447	6,191.042	
Error (adj.)			45.195	

(2) TRP - Time

Source	SS	DF	MS	F
Between	266,868.003	2	133,434.001	61.504**
Within	132,845,424.360	447	297,193.340	
Error (adj.)			2,169.516	

(3) TRP - Accuracy

Source	SS	DF	MS	F
Between	21.872	2	10.936	12.585**
Within	53,232.587	447	119.088	
Error (adj.)			.869	

(Table continued on next page)

Table 13 - cont.

ANOV Summary Table - Analysis of Vision Groups

(4) WAIS

Source	SS	DF	MS	F
Between	9.661	2	4.830	2.018--
Within	146,512.611	447	327.769	
Error (adj.)			2.393	

(5) Asher - Frohman Maze

Source	SS	DF	MS	F
Between	494.209	2	247.104	3.024*
Within	5,003,692.162	447	11,193.942	
Error (adj.)			81.716	

(6) Rate of Placement

Source	SS	DF	MS	F
Between	7.538	2	3.769	21.415**
Within	10,763.008	447	24.078	
Error (adj.)			.1758	

(7) VISAB

Source	SS	DF	MS	F
Between	6.205	2	3.102	5.988**
Within	31,693.567	447	70.903	
Error (adj.)			.518	

(Table continued on next page)

Table 13 - cont.

ANOV Summary Table - Analysis of Vision Groups

(8) Onset Age

Source	SS	DF	MS	F
Between	13.121	2	6.560	24.296**
Within	16,557.626	447	37.042	
Error (adj.)			.270	

(9) Salary

Source	SS	DF	MS	F
Between	8.831	2	4.416	.548--
Within	493,378.629	447	1,103.755	
Error (adj.)			8.057	

(10) Job Hierarchy

Source	SS	DF	MS	F
Between	7.638	2	3.819	2.343--
Within	99,784.634	447	223.232	
Error (adj.)			1.630	

*Significance at the .05 level.

**Significance at the .01 level.

--Non-significance.

APPENDIX D

LATENT ROOTS AND UNROTATED FACTOR LOADINGS

Table 14

Latent Roots and Unrotated Factor Loadings

High Vision

Latent Roots:

$\text{Lambda}_1 = 3.83608$

$\text{Lambda}_2 = 1.43710$

$\text{Lambda}_3 = .43312$

Unrotated Loadings:

		I	II	III	h^2
TRP	1.	.8912	.3747	.0430	.9365
	2.	-.7248	-.3584	.1570	.6784
	3.	.8526	.2163	.1010	.7839
WAIS	4.	.5604	-.3346	.2261	.4771
AF	5.	-.1702	-.0281	-.0382	.0312
RATE	6.	.5630	.2364	-.3586	.5014
VISAB	7.	.7490	-.0059	.2574	.6273
ONSET	8.	.1312	-.2014	.2882	.1408
CRIT.	9.	.5884	-.6404	-.1179	.7702
	10.	.4526	-.7086	-.2281	.7590

Table 15

Latent Roots and Unrotated Factor Loadings

Mid-Vision

Latent Roots:

Lambda$_1$ = 4.11158

Lambda$_2$ = 1.11851

Lambda$_3$ = .51188

Unrotated Loadings:

		I	II	III	h^2
TRP	1.	.9331	.2703	.0002	.9437
	2.	-.6971	-.3097	-.3578	.7099
	3.	.8416	.1917	-.2819	.8245
WAIS	4.	.6430	-.3161	-.2477	.5747
AF	5.	-.3207	.0487	.0334	.1063
RATE	6.	.6610	.2178	.1400	.50395
VISAB	7.	.7737	-.0423	-.2305	.6535
ONSET	8.	-.2953	-.0796	-.3366	.2068
CRIT.	9.	.5024	-.5751	.1343	.6233
	10.	.3938	-.6513	.1944	.6171

Table 16

Latent Roots and Unrotated Factor Loadings

Low Vision

Latent Roots:

Lambda$_1$ = 4.62845

Lambda$_2$ = 1.04945

Lambda$_3$ = .43350

Unrotated Loadings:

		I	II	III	h^2
TRP	1.	.9257	.2460	.0447	.9194
	2.	-.7373	-.3402	.1821	.6925
	3.	.8794	.1907	.1535	.8333
WAIS	4.	.7479	-.1468	.1720	.6105
AF	5.	-.3011	-.0114	-.2754	.1666
RATE	6.	.6456	.1856	-.2773	.5281
VISAB	7.	.7834	.0007	.2162	.6604
ONSET	8.	-.4711	.0084	.3503	.3447
CRIT.	9.	.5433	-.6573	-.0041	.7272
	10.	.5068	-.5904	-.1515	.6284

APPENDIX E

RESIDUAL MATRICES

THREE VISION GROUPS

Table 17

High Vision Group

Matrix of Residuals

	1	2	3	4	5	6	7	8	9	10
	-.046	.021	.023	-.008	-.016	.005	.020	.008	-.005	.001
TRP		.034	-.091	-.030	.096	.021	.017	-.032	-.012	.015
			.036	.043	-.085	.036	.001	-.060	.004	-.021
WAIS				-.008	-.025	.014	.023	-.041	-.060	.059
AF					.102	-.064	-.037	.001	-.038	-.027
RATE						-.038	-.034	.000	.045	-.024
VISAB							-.036	.023	.001	.003
ONSET								.100	.085	-.082
CRIT.									-.030	.034
										-.043

Table 18

Mid-Vision Group

Matrix of Residuals

	1	2	3	4	5	6	7	8	9	10
	-.030	.010	.034	-.029	.000	.012	.003	-.030	.012	.011
TRP		-.012	.047	-.009	-.014	-.004	.035	.011	-.014	.027
			.013	-.007	.040	.003	-.033	-.036	-.010	.011
WAIS				-.039	-.029	.012	.071	-.011	-.012	.020
AF					.014	.054	-.011	.054	.003	-.009
RATE						-.005	.005	.002	.035	-.028
VISAB							-.031	.013	-.002	-.029
ONSET								-.001	.067	-.064
CRIT.									-.092	.079
										-.086

Table 19

Low Vision Group

Matrix of Residuals

	1	2	3	4	5	6	7	8	9	10
	-.004	.013	.058	-.042	-.018	.004	-.036	-.004	.029	-.010
TRP		.026	.072	-.058	-.058	.012	-.080	-.019	.058	-.033
			.043	-.033	-.001	.021	-.049	-.009	.025	-.016
WAIS				-.019	.011	-.009	.068	.018	.008	-.002
AF					-.001	-.021	-.020	.027	.010	.006
RATE						-.054	-.005	-.070	-.006	-.007
VISAB							-.025	.032	-.005	.003
ONSET								-.050	-.017	-.003
									-.073	.062
CRIT.										-.061

VITA

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Date and Place of Birth

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Education

B.S., 1955. St. Louis University

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Ph.D., Candidate for 1960. Purdue University

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Graduate Teaching Assistant in Psychology, St. Louis University September, 1955 to June, 1956.

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Organizations

Sigma Xi

Psi Chi

Midwestern Psychological Association

American Psychological Association

MIC60
6135